

## CLAIMS

What is claimed is:

1. A laser device comprising:
  - 5 a gain medium in the shape of a polyhedron in which a beam enters the gain medium through one face of the polyhedron;  
wherein the beam is reflected internally at one or more surfaces with each reflection occurring in such a manner that the beam propagates within approximately the plane of incidence; and,
  - 10 wherein the beam enters and exits the gain medium at different locations.
2. The laser device of Claim 1 wherein the different locations are on one surface of the polyhedron.
- 15 3. The laser device of Claim 1 wherein the different locations are on different surfaces of the polyhedron.
4. The laser device of Claim 1 in which optical pump radiation enters the gain medium through the one or more surfaces from which the beam will be reflected.
- 20 5. The laser device of Claim 1 in which optical pump radiation enters the gain medium through one or more surfaces from which the beam will not be reflected.
6. The laser device of Claim 1 in which the optical pump radiation enters the gain medium through one or more surfaces of the polyhedron which are approximately parallel to the plane of incidence.
- 25 7. The laser device of Claim 1 in which the optical pump radiation enters the gain medium through one or more surfaces of the polyhedron which are approximately perpendicular to the plane of incidence.
- 30 8. The laser device of Claim 1 further comprising heat sinks coupled to external surfaces of the gain medium.

9. The laser device of Claim 8 wherein the flow of heat from the gain material is generally within a plane transverse to the plane of incidence.

10. The laser device of Claim 1 wherein at least one of the one or more surfaces are oriented at approximately 45 degrees with respect to the path of the beam.

11. A laser device comprising:

a gain medium in the shape of a polyhedron in which a beam enters the gain medium through one face of the polyhedron;

10 wherein the beam is reflected internally at one or more surfaces with each reflection occurring in such a manner that the beam propagates within approximately the original plane of incidence; and,

wherein the polyhedron contains an internal core section in which there is no gain material.

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12. The laser device of Claim 11 in which the internal core section is in a geometry which prevents uncontrolled laser oscillation.

13. The laser device of Claim 11 in which a surface of the internal core section reflects pump radiation back towards a portion of the gain medium through which the laser beam will pass.

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14. The laser device of Claim 11 wherein the beam enters and exits the gain medium at different locations, wherein the different locations are on one surface of the polyhedron.

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15. The laser device of Claim 11 wherein the beam enters and exits the gain medium at different locations, wherein the different locations are on different surfaces of the polyhedron.

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16. The laser device of Claim 11 in which optical pump radiation enters the gain medium through the one or more surfaces from which the beam will be reflected.

17. The laser device of Claim 11 in which the optical pump radiation enters the gain medium through one or more surfaces of the polyhedron which are approximately parallel to the plane of incidence.

5           18. The laser device of Claim 11 in which the optical pump radiation enters the gain medium through one or more surfaces of the polyhedron which are approximately perpendicular to the plane of incidence.

10           19. The laser device of Claim 11 in which optical pump radiation enters the gain medium through one or more surfaces from which the beam will not be reflected.

20. The laser device of Claim 11 further comprising heat sinks coupled to external surfaces of the gain medium.

15           21. The laser device of Claim 20 wherein the flow of heat from the gain material is generally within a plane transverse to the plane of incidence.

22. The laser device of Claim 11 wherein at least one of the one or more surfaces are oriented at approximately 45 degrees with respect to the path of the beam.

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23. A laser device comprising:

a gain medium in the shape of a polyhedron in which a beam enters the gain medium through one face of the polyhedron;

25           wherein the beam is reflected internally at one or more surfaces with each reflection occurring in such a manner that the beam propagates within approximately the original plane of incidence; and,

wherein at least one of the one or more surfaces are oriented at about 45 degrees with respect to the path of the beam.

30           24. The laser device of Claim 23 wherein the beam enters and exits the gain medium at different locations, wherein the different locations are on one surface of the polyhedron.

25. The laser device of Claim 23 wherein the beam enters and exits the gain medium at different locations, wherein the different locations are on different surfaces of the polyhedron.

5           26. The laser device of Claim 23 in which the optical pump radiation enters the gain medium through one or more surfaces of the polyhedron which are approximately parallel to the plane of incidence.

10           27. The laser device of Claim 23 in which the optical pump radiation enters the gain medium through one or more surfaces of the polyhedron which are approximately perpendicular to the plane of incidence.

15           28. The laser device of Claim 23 in which optical pump radiation enters the gain medium through one or more surfaces from which the beam will not be reflected.

            29. The laser device of Claim 23 in which optical pump radiation enters the gain medium through one or more surfaces from which the beam will be reflected.

20           30. The laser device of Claim 23 further comprising heat sinks coupled to external surfaces of the gain medium.

            31. The laser device of Claim 30 wherein the flow of heat from the gain material is generally within a plane transverse to the plane of incidence.